

LESSON 11 – BASIC INTERCEPTS

So now we know how to win a dogfight. How do we go about transforming a radar contact at 50 miles into fireball?

Reading:

Shaw pp.31-61, **pp.346-355**

11-F16 **Sec 4.13-4.13.5.3 (pp. 105-110)**

Problems/Questions:

Work on Problem Set 2

Objectives:

- 11-1 Understand the steps of a baseline intercept.
 - 11-2 Know the definition of Collision Antenna Train Angle (CATA).
 - 11-3 Understand the factors that affect an air-to-air missile Weapons Employment Zone (WEZ).
 - 11-4 Know the definitions of F-pole and E-pole.
 - 11-5 Know the basics of Radar Missile Defense (RMD) and Infrared Missile Defense (IRMD).
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Last Time: Review of computer exercise
Energy vs. Angles
Vertical Turning
Maneuvers
Flat Scissors
Rolling Scissors

Today: Intercepts
Intercept terminology
Basic Intercept Procedures
Missile Defense Tactics

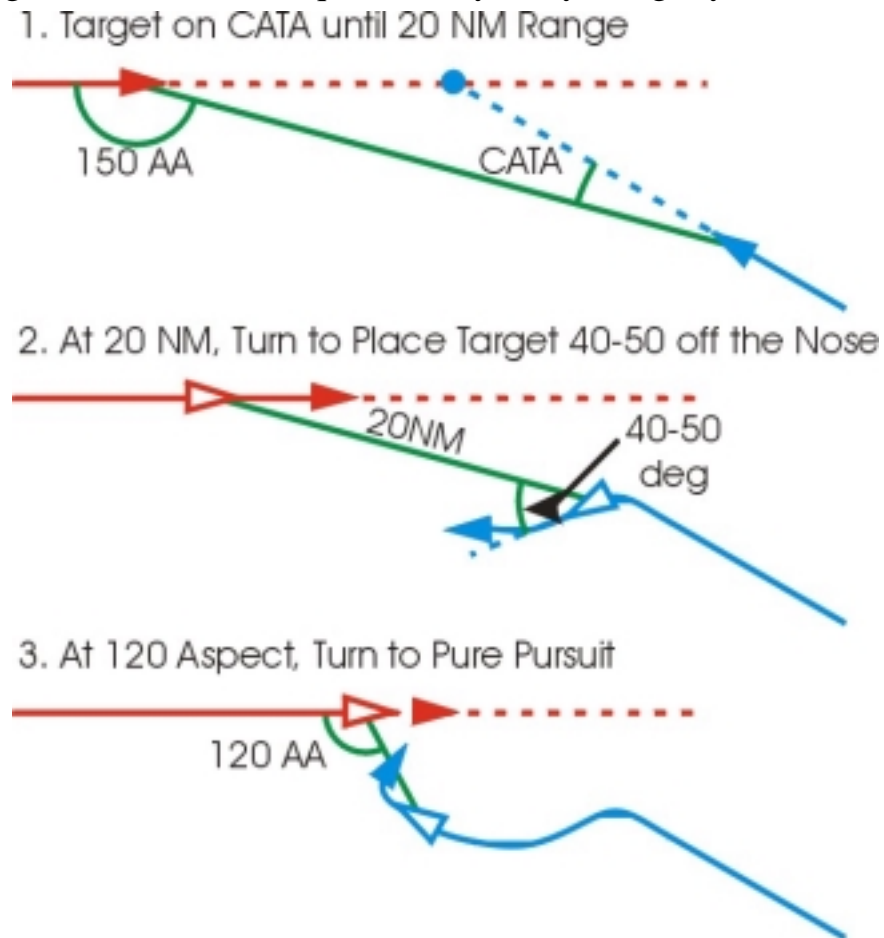
So far we've discussed visual fighting. But we always assumed that a bandit just appeared, conveniently aligned, right at your 12 o'clock (or maybe your six). How did that magical occurrence happen? We needed to do some maneuvering PRIOR to acquiring the visual. This means we need to be adept in using (and understanding) the on-board sensors, including a variety of components such as radar, RHAW, and IRSTS.

Let's see how the concept of the lead turn can be using sensors instead of visually. This will allow us to set up our conversion turn from great distances. These sensor-driven lead turns are called *intercepts*, and the one we'll discuss in particular today is called a stern *conversion*.

The basic stern conversion looks a lot like this figure. Notice that keeping the target 40-50 degrees off the nose requires that you fly a slightly curved path. This

intercept is set up for the worst conditions: night and/or in the weather, so even the conversion turn once you reach 120 aspect angle shouldn't require more than 30 deg of bank. It's a nice little set up that should put you within VID or weapons parameters in a fairly short amount of time. Just as an aside,

if both aircraft are flying about 400 kts, it will take less than two minutes to cover the 20NM range between them at the point where you start to get turning room.



Although we're going to look at similar topics (radar, IR) in more depth in Block II, we'll overlap a little in today's lesson. If you want to know how to defeat a missile, you must understand what's making the missile maneuver!

General missile characteristics:

Usually propelled in an initial boost phase

After motor burnout, the missile glides and loses energy!

Typically not G-limited (G won't break the missile, but the missile still suffers from induced drag)

Steering control either by aerodynamic forces or thrust vectored

Types of missile guidance:

Command (Command LOS)

- Like a “remote control” toy with a warhead
- Both target and missile are tracked by the launcher
- Tracking done via radar or electro-optical

Beam-rider

- Similar to CLOS, but the missile stays in the center of the launcher’s tracking beamwidth without requiring commands.

Homing

- Passive (IR)
- Semi-Active (illuminator)
- Active (on-board transmitter and receiver)
- The passive and active seekers are known as “fire and forget”, while the semi-active seeker requires launcher illumination throughout the engagement.

Best option: defeat the launcher!

- Launch first...makes it hard for him to get off a shot if he’s defensive
- Discuss F-Pole
- Beat his radar – go for the doppler “notch”. Put threat on the beam, descend and disappear in the ground clutter)
- Mention the Doppler effect: material for Block III
- Turn and escape, if you’re fast enough

Defeat the missile [Discuss missile envelope slide]

- Extend out of its kinematic range
- Beam the missile and descend, defeating Doppler and fuzing
- Employ countermeasures (more in Block III)
- Last ditch maneuver (missile generally pulls 5 times the G of the target)
- Missile might run out of energy because of D_i ...you hope.

Show Out of the Sun (30 min)